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(54) **CAP FOR DISPENSING VISCOUS LIQUIDS**

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(58) **Field of Search** 222/464.1, 211, 222/212, 556, 564, 546, 547; 220/254, 259, 837, 847; 215/235, 237; 210/244, 248

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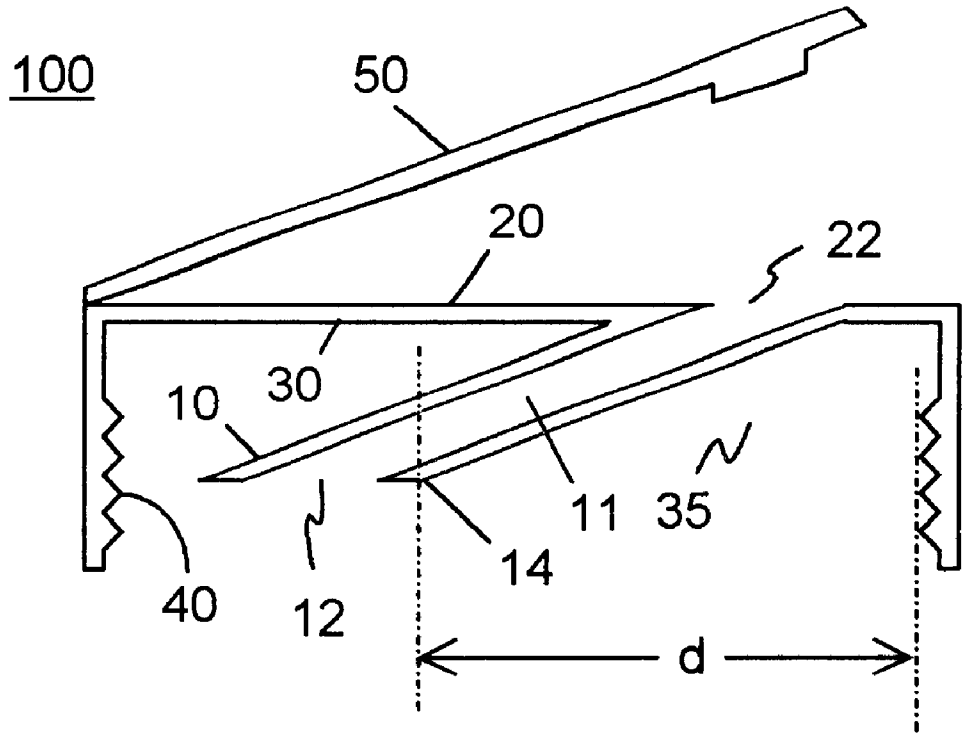
(57) **ABSTRACT**

A cap for use in dispensing viscous liquids from containers without the accompaniment of lower viscosity liquid present in the container. The cap has a top portion with an outside surface and an inside surface and an elongated conduit formed at a pre-determined angle. The elongated conduit has an outlet and an inlet. The outlet is situated either eccentrically or concentrically on the outside surface of the top portion such that at least one point on the circumference of the top portion is greater than 10 millimeters from the edge of the inlet.

15 Claims, 4 Drawing Sheets



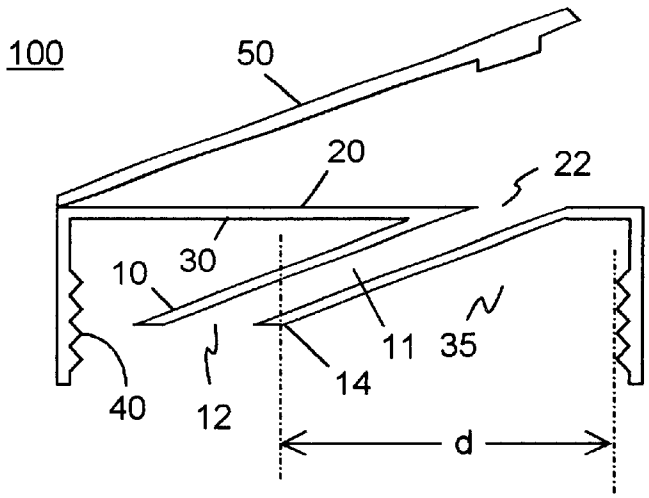


Fig. 1

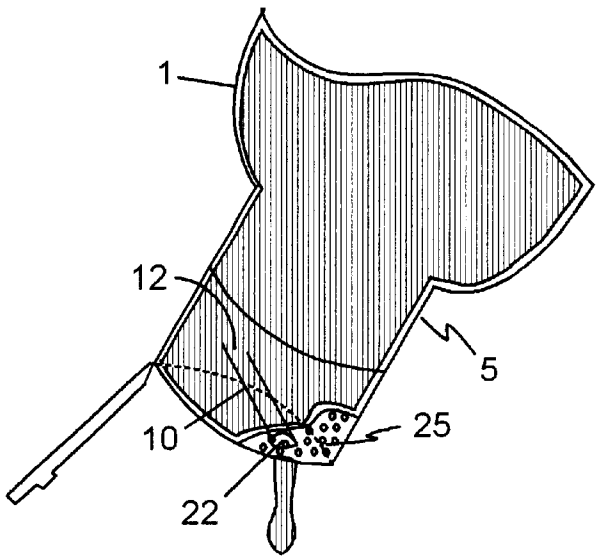


Fig. 2

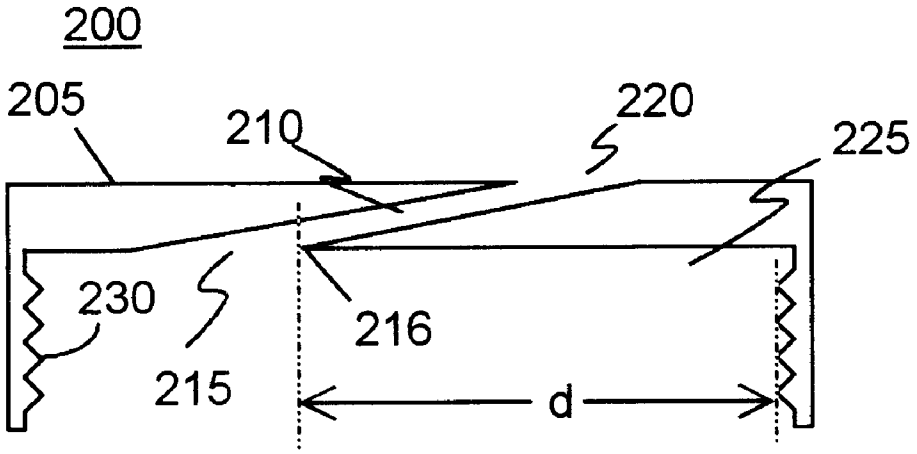


Fig. 3A

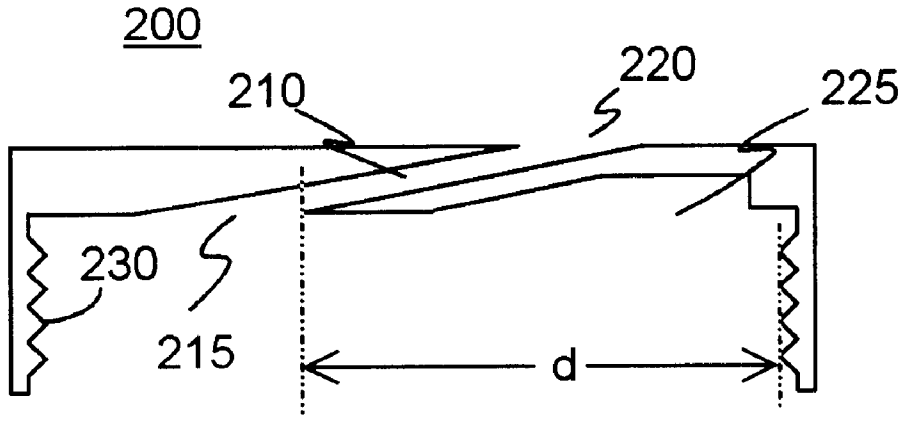


Fig. 3B

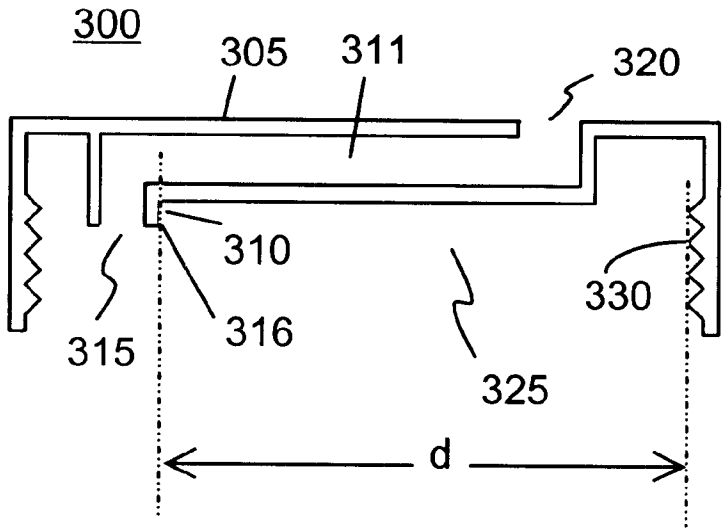

300
305
311
320
310
315
316
330
325
d

Fig. 4

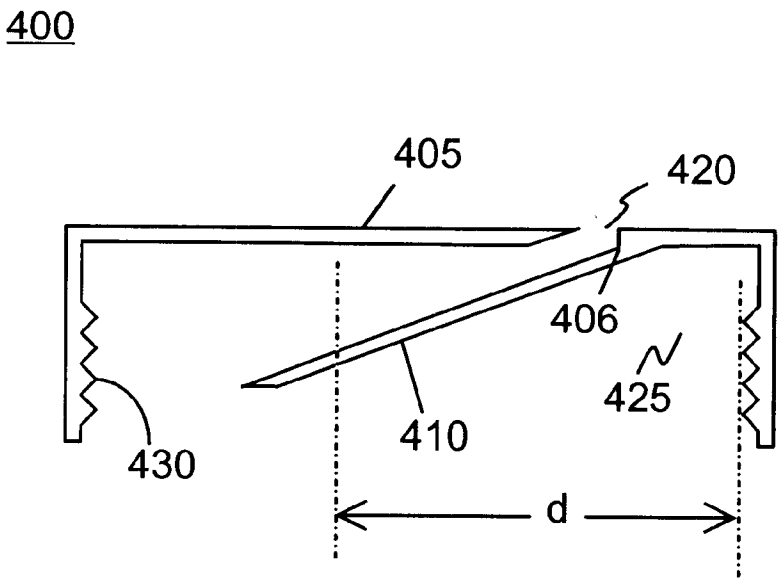

400
405
420
406
425
410
430
d

Fig. 5

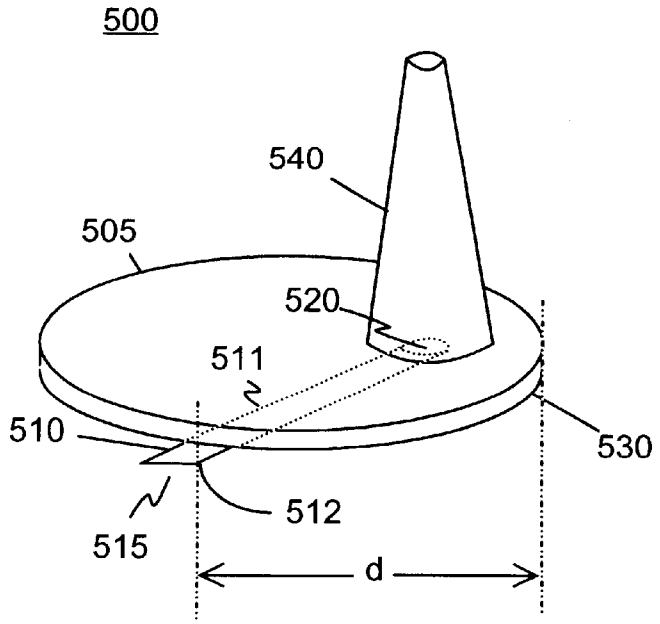

500
540
505
520
511
510
530
512
515
d

Fig. 6

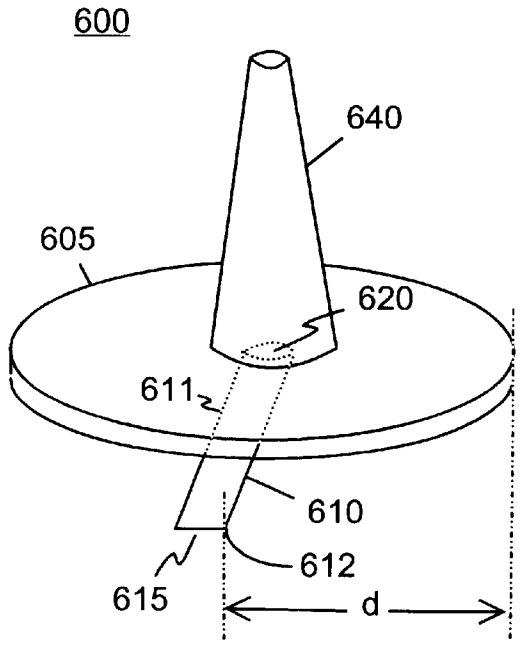

600
640
605
620
611
610
612
615
d

Fig. 7

CAP FOR DISPENSING VISCOUS LIQUIDS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to caps for dispensing viscous liquids from flexible plastic containers. More particularly, the present invention relates to caps for dispensing viscous liquids without the accompaniment of lower viscosity liquid present in the container. Even more particularly, the present invention relates to caps for dispensing viscous liquids without lower viscosity liquid while simultaneously preventing accumulation of viscous liquids under the lid.

2. Description of the Prior Art

There are many different types of packaging for viscous liquids such as ketchup, mustard, shampoo, and body cream. It is common to use a plastic cap for dispensing viscous liquids from flexible plastic containers. Some caps have threaded inner walls so that they may be screwed onto the container. Other caps snap into the top of the container. These caps have single or multiple openings for dispensing the viscous liquid. Some have a recessed area around the opening on the underside of the lid. Others include a convex or concave projection to assist in dispensing the viscous liquid.

Two types of dispensing package for viscous liquids, as seen in U.S. Pat. Nos. 5,071,039 and 5,125,541, allow the user to dispense a measured quantity of viscous liquid. These packages are comprised of a reservoir for holding the viscous liquid inside the container, a channel for measuring the quantity of viscous liquid to be dispensed, a spout for the viscous liquid to exit the package, and an air trap to replenish the package with air. Viscous liquids are difficult to measure and pour. These packages are designed to alleviate this problem with an inexpensively produced package. They can, for example, measure and dispense a quantity of honey with sweetness equal to one teaspoon of sugar. These packages do not, however, address the problem of lower viscosity liquid discharge.

In another type of package for dispensing viscous liquids, there are recessed areas for collecting excess water and other debris to prevent contamination of the viscous liquid within the container, as shown in U.S. Pat. No. 5,411,182. The recesses are in the form of concentric rings extending from the center of the dispenser toward the outward edge. The outermost edge of the rings scrapes the sides of the container to prevent accumulation of the viscous liquid on the inside of the container. This invention was intended for use in dispensing viscous liquids intended for personal hygiene. It dispenses many small streams of viscous liquid from the holes in its surface rather than the single stream preferable for dispensing most types of viscous liquids. While the invention prevents lower viscosity liquid from entering the portion of the container holding the viscous liquid, it does not prevent its discharge from the container. This invention is only useful for dispensing a few types of viscous liquids, is expensive to produce, and does not address the problem of lower viscosity liquid discharge.

In yet another type of package for dispensing viscous liquid, there is an opening designed to minimize accumulation of viscous liquid adjacent to the outlet of the container, as shown, for example, in U.S. Pat. No. 6,041,975. The upper surface of the cap, including the outlet through which viscous liquid is dispensed, is recessed in a portion of the container. The container has a flexible portion that can be squeezed for dispensing the product through the outlet. The upper surface of the container around the outlet can be modified to minimize accumulation of the viscous liquid outside the outlet. This invention does not address the accumulation of viscous liquid under the surface of the cap that exacerbates the problem of lower viscosity liquid discharge.

The inventions cited have various advantages and disadvantages with regard to dispensing viscous liquids, but none fully address the problem of lower viscosity liquid discharge from viscous liquid containers. Furthermore, they do not offer a cost-effective solution to the problem of viscous liquid buildup that impedes dispensing. Therefore, what is needed is a method of dispensing viscous liquid that prevents discharge of lower viscosity liquid and is manufactured with minimal cost.

SUMMARY OF THE INVENTION

Among the objectives of the present invention are to provide a cap to dispense viscous liquids from plastic containers without the accompaniment of lower viscosity liquid. The cap is compatible with plastic containers typically used to package viscous liquids. Caps currently in use for dispensing viscous liquids do not prevent the discharge of lower viscosity liquid that may have built up in the attached container. Ketchup packaging is an excellent example. Condensation and settling, common in viscous condiments like ketchup, produces a lower viscosity, or watery, liquid that sits on top of the viscous condiment. When a consumer desires to use a condiment and turns the container upside-down to dispense the desired condiment, the lower viscosity liquid is typically discharged prior to the condiment. This problem occurs most frequently after the condiment is stored and then re-used.

Improvements to caps used for dispensing viscous liquids have failed to remedy the discharge of lower viscosity liquid. Some of these caps have a recess around the dispensing outlet which may initially prevent watery discharge, but whose usefulness is diminished after initial use of the product. The recess is designed to collect lower viscosity liquid when the container is inverted, allowing the viscous liquid to be dispensed while the lower viscosity liquid is held in the recess. When a container holding viscous liquid is inverted, however, the viscous liquid with greater density penetrates the lower viscosity liquid and clings to the underside of the cap. As the container is returned to an upright position, some viscous liquid may remain adhered to the underside of the lid while the lower viscosity liquid drains back to the top of the product in the container.

The product adhering to the underside of the cap eventually becomes more viscous and may dry and harden, filling the recess area. When the container is next inverted for use, there is no recess to collect the lower viscosity liquid as it has been filled with viscous liquid adhered to the cap. As a result, the lower viscosity liquid, which moves more quickly than the viscous liquid, precedes the desired viscous liquid as it is dispensed.

When used to dispense viscous liquids, caps with concentric outlets are especially vulnerable to adhesion and recess blocking problems. The adhesive property, i.e. surface tension, of viscous liquids enables them to cling to a particular surface against the force of gravity. The adhesive property of viscous liquids increases as the size of the surface they cling to is reduced. A concentric opening breaks up the surface of a cap, creating smaller surface areas that increase the possibility of viscous liquid accumulation. When the surface tension and adhesion of the viscous liquid

accumulated under the cap is greater than the pull of gravity, it will remain in the cap recess. The retention of the viscous liquid in the cap recess prevents the collection of the lower viscosity liquid the recess was designed to retain. As a consequence, the lower viscosity liquid has nowhere else to go and is dispensed prior to the desired viscous liquid.

The present invention comprises a cap with an eccentrically located outlet on the top side of the cap and an elongated tube or channel extending at an angle from the inlet on the underside of the cap to the outlet. A unique aspect of the present invention is the distance between the inside of the cap wall or container wall where the cap is attached on a plane parallel to the underside of the cap and the outer edge of the inlet of the tube or channel is greater than 10 millimeters. In other words, the distance between the projection of the opening of the Inlet tube onto the plane of the underside of the cap and the furthest point on the cap edge, which will coincidentally place the projection of the outlet opening onto the same plane between the furthest point on the cap edge and the projection of the inlet onto the inside surface, will be more than 10 millimeters. By having the edge of the inlet more than 10 millimeters from the cap edge, the distance lowers surface tension and decreases adhesion of the viscous liquid. This distance reduces the occurrence of viscous liquid buildup on the underside of the cap.

The present invention is also unique where the elongated tube or channel is preferably set at an angle, or the outlet and inlet are spaced from each other creating an angle to the vertical, to minimize collection of undesired lower viscosity liquid in the tube or channel as the container is angled for dispensing the higher viscosity liquid such as ketchup, mustard and the like. The position and angle of the elongated tube or channel create a larger area on which to collect and disperse the lower viscosity liquid as the desired viscous liquid is dispensed.

The objects of the present invention are met by providing a cap designed to eliminate the problem of lower viscosity liquid discharge when dispensing viscous liquids. The cap may be affixed to a variety of flexible plastic containers commonly used in dispensing viscous liquids and is manufactured with a minimum of cost and materials. Further objects and advantages of this invention will be made apparent in the following description, references being made to the accompanying drawings illustrating the preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a cross-sectional view of a preferred embodiment of the present invention, showing an elongated tube extending from the underside of the cap at an angle, which tube is in communication with an outlet situated eccentrically in the surface of the cap.

FIG. **2** is a perspective view of a preferred embodiment of the present invention attached to a condiment container showing where lower viscosity liquid is collected and disbursed in a recess area and desired viscous liquid is dispensed when the invention is attached to a container.

FIG. **3**A is a cross-sectional view of another embodiment of the present invention showing a channel extending through a top portion of the cap from the outlet to the inlet at an angle.

FIG. **3**B is a cross-sectional view of another embodiment of the present invention illustrated in FIG. **3**A showing a recessed portion on the underside of the top portion of the cap.

FIG. **4** is a cross-sectional view of another embodiment of the present invention showing a channel extending from the outlet on the top surface of the cap and cross the underside then downwardly.

FIG. **5** is a cross-sectional view of another embodiment of the present invention showing an extending flange portion extending at an angle from the outlet.

FIG. **6** is a perspective view of another embodiment of the present invention showing an elongated tube extending at an angle from the underside of a dispensing cap having a pull-up or screw-up spout protruding from and situated eccentrically in the topside of the cap.

FIG. **7** is a perspective view of another embodiment of the present invention showing an elongated tube extending at an angle from the underside of a dispensing cap having a pull-up or screw-up spout protruding from and situated concentrically in the topside of the cap.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

For the purposes of promoting an understanding of the principles of the present invention, references will now be made to one of the preferred embodiments of the present invention as illustrated in FIGS. **1–7** using specific language to describe the same.

FIG. **1** shows a cap **100** having a top surface **20**, a bottom surface **30**, an elongated tube **10**, an inlet **12**, an outlet **22**, a wall portion **40**, and a lid **50**. Outlet **22** is located eccentrically in top surface **20** and is in communicative contact with passageway **11** of elongated tube **10**. Elongated tube **10** is angled to bottom surface **30** such that inlet edge **14** is a pre-determined distance d from wall portion **40**. Preferably, distance d is greater than 10 millimeters. Wall portion **40** generally has a securing component such as threads, a retaining edge and the like for securing cap **100** to a container (not shown). There is also defined a recess area **35** between inlet edge **14** and wall portion **40**. Recess area **35** is designed to hold the lower viscosity liquid as the container is inverted for dispensing the desired viscous liquid so that the lower viscosity liquid cannot enter inlet **12** of elongated tube **10**. To prevent accumulation of viscous liquid on bottom surface **30** in an amount that would effectively negate the benefits of the recess area **35** for holding the low viscosity liquid, the inlet edge **14** of inlet **12** must be at one point more than 10 millimeters from wall portion **40** on a plane parallel to the top surface **20** of cap **100**. The placement of the inlet edge **14** of elongated tube **10** more than 10 millimeters from wall edge **40** is critical. It reduces the possibility that surface tension will create a situation where viscous liquids adhere to bottom surface **30** of cap **100**, filling the space intended to receive the lower viscosity liquid, and causing the discharge of lower viscosity liquid with the desired viscous liquid. Condiments such as ketchup, mustard, and relish are examples of viscous liquids that are advantageously dispensed from cap **100**, which is designed to prevent discharge of lower viscosity liquid.

Cap **100** is preferably a single molded piece made from a plastic material exhibiting the desired characteristics required for dispensing caps.

Elongated tube **10** is preferably between about 1 millimeter and 15 millimeters in length. Elongated tube **10** may extend into the container holding viscous liquid at an angle between about 5 and less than 90 degrees from outlet **22**. Both inlet **12** and outlet **22** are of a size that permits the viscous liquid to enter and exit passageway **11** of elongated tube **10**, preferably between about 3 to about 10 millimeters

wide for circular-shaped channels. Inlet **12** is suspended in the attached container to collect the viscous liquid for dispensing and is preferably angled to assist in the collection of viscous liquid.

Wall portion **40** is preferably of a height that allows cap **100** to be attached to a container via a screwing or snapping method. Where wall portion **40** is to be screwed onto the container, it has threads molded into the plastic on the inside of wall portion **40**. Alternatively, cap **100** may have a ridge on the inside of wall portion **40** along its circumference that allows cap **100** to be snapped over a receiving portion of the neck of a container.

In an alternative embodiment of cap **100** where the cap is press-fit into the neck of a container, wall portion **40** may be nonexistent. Regardless of the method of attachment, when cap **100** is attached to a container, it will form recess area **35** previously described.

FIG. **2** shows a perspective view of a preferred embodiment of cap **100** attached to a container in a manner previously described in FIG. **1**. FIG. **2** illustrates how lower viscosity liquid is collected within recess area **35** while the desired viscous liquid is dispensed through elongated tube **10**. As the container is inverted, the lower viscosity liquid precedes the viscous liquid as they both travel down the lower side **5** of the container **1** toward outlet **22** of attached cap **100**. The lower viscosity liquid settles in recess area **35** while the desired viscous liquid fills in the area on the underside of cap **100** until it reaches the level of inlet **12**. With the undesired lower viscosity liquid trapped and dispersed in recess area **35**, the viscous liquid enters inlet **12**, fills passageway **11** of tube-like projection **10**, and is dispensed through outlet **22**. Inlet **12** is angled and positioned to take advantage of the customary method of dispensing a viscous fluid from containers having eccentrically located outlets.

FIG. **3**A illustrates another embodiment of the present invention. FIG. **3**A shows a cap **200** having a cap body portion **205**, a wall portion **230**, and a channel **210** extending through cap body portion **205** from an inlet **215** at an angle to an outlet **220**. The outer edge **216** of inlet **215** closest to wall portion **230** on the side nearest outlet **220** is at least 10 millimeters from the wall. The area formed between outer edge **216** and wall portion **230** just described is recess area **225**. Recess area **225** collects lower viscosity liquid while the desired viscous liquid is dispensed in the customary fashion as previously described in FIG. **1**. As in FIG. **3**A, viscous liquid is collected at inlet **215** and dispensed through outlet **220** of cap **200**. Inlet **215**, outlet **220** and channel **210** are preferably of a size that permits the higher viscosity liquid to be dispensed through cap **200**. Wall portion **230** is preferably of a height and shape that allows cap **200** to be screwed or snapped onto a plastic container holding viscous liquid in the manner previously. Cap **200** may also be designed as an insert to be inserted such as by press fitting into the neck of a container. In such an embodiment, cap **200** may or may not have wall portion **230**.

FIG. **3**B is a modified version of cap **200** illustrated in FIG. **3**A. Cap **200** has a cap body portion **205** that is thinner in recess area **225** than the rest of cap body portion **205**. Causing cap body portion **205** to be thinner in this region provides for a larger volume of low viscosity liquid such as water to be collected in recess area **225**, thus preventing the low viscosity liquid from being dispersed with the more viscous liquid such as ketchup, mustard and the like.

FIG. **4** shows a cross-section of another embodiment of the present invention. FIG. **4** shows cap **300** having a top portion **305**, a passageway **311** and wall portion **330**. Passageway **310** forms a channel with two 90-degree turns from inlet **315** to outlet **320**. Beginning at inlet **315**, passageway **310** extends upwards for a length, preferably less than 15 millimeters, before turning approximately 90-degrees in a direction parallel to top portion **305** and toward the central axis of top portion **305**. Passageway **310** continues pass the centerpoint of top portion **305** for a pre-determined distance such that the distance between inlet edge **316** and wall portion **330** is greater than ten (10) millimeters. This greater than 10 millimeter length will reduce the probability of viscous liquid adhering to the underside of cap **300** and filling recess area **325**. Passageway **310** then makes a second 90-degree turn upwards through top portion **305** for a length preferably between about 1 to about 6 millimeters to outlet **320**.

Recess area **325** collects lower viscosity liquid while the desired higher viscosity liquid is dispensed as previously described in FIG. **1**. As in the previously mentioned embodiments, the higher viscosity liquid is collected at inlet **315** and dispensed through outlet **320** of cap **300**. Inlet **315**, outlet **320** and passageway **310** are preferably of a size that permits the higher viscosity liquid to be relatively easily dispensed from cap **300**. Wall portion **330** is preferably of a length that allows cap **300** to be screwed or snapped onto a plastic container holding viscous liquid in the manner previously described.

FIG. **5** shows yet another embodiment of the present invention. Cap **400** has a top portion **405**, an outlet **420**, a flange portion **410**, and a wall portion **430**. Outlet **420** is located eccentrically in top portion **405**. Flange portion **410** is shaped to fit within the neck of a container and is connected to top portion **405** at a point on the underside **406** of top portion **405** adjacent to outlet **420** and closest to wall portion **430**. Flange portion **410** is angled away from wall portion **430** nearest outlet **420** creating recess area **425**. When condiments such as ketchup, mustard and the like are dispensed from squeezable containers having a cap with an eccentrically located opening, the customary tipping of the bottle toward the outlet to dispense the desired condiment causes the lower viscosity liquid to collect within recess area **425**.

FIG. **6** shows a perspective view of another embodiment of the present invention for use with external pull-up or twist-up spouts commonly attached to caps used in dispensing mustard and other highly viscous liquids. Cap **500** has a top portion **505**, a spout **540**, an outlet **520** situated eccentrically in top portion **505** and directly below spout **540**, an inlet **515**, and an elongated tube **510** having a passageway **511** between inlet **515** and outlet **520**. Inlet edge **512** is situated more than 10 millimeters from the inner wall **530** on a diameter line parallel to top portion **505** running through the center of a projection of outlet **520** lying within the same plane as the diameter line. Elongated tube **510** extends at an angle from outlet **520** to inlet **515**. Inlet **515** and outlet **520** are preferably of a size that permits the viscous liquid to enter and exit elongated tube **510**, as previously described in FIG. **1**.

FIG. **7** shows a perspective view of another embodiment of the present invention for use with external pull-up or twist-up spouts as previously described in FIG. **6**. Cap **600** has a top portion **605**, a spout **640**, an outlet **620** situated concentrically in top portion **605** and directly below spout **640**, an inlet **615**, and an elongated tube **610** having a passageway **611** between inlet **615** and outlet **620**. Inlet edge **612** is situated more than 10 millimeters from the inner wall **630** on a diameter line parallel to cap top portion **605**

running through the center of a projection of outlet **620** lying within the same plane as the diameter line. Elongated tube **610** extends at an angle from outlet **620** to inlet **615**. Inlet **615** and outlet **620** are preferably of a size that permits the viscous liquid to enter and exit elongated tube **610**, as previously described in FIG. **1**. Twist-up or pull-up spout **640** extends upwards from top portion **605** of cap **600** away from outlet **620** and elongated tube **610**.

It should be understood that the above description of the invention has been presented for purposes of illustration and no limitation of the scope of the invention is hereby intended. The terminology used herein is for the purpose of description and not limitation. Any modifications or variations in the above depicted method or device, and such further applications of the principles of the invention as illustrated herein, as would normally occur to one skilled in the art to which the invention relates are considered to be within the spirit of the invention.

What is claimed is:

1. A viscous-liquid dispensing cap comprising:

a top portion having an outside surface, an inside surface and an outlet in said outside surface; and

a passageway having an inlet on one end and connected to said outlet on the other end, said inlet and said outlet being vertically and horizontally offset from each other and wherein said inlet is at least ten millimeters from a perpendicular axis located at a point on the circumference of said top portion that is closer to said outlet than said inlet, said passageway being acutely angled to said inside surface and having a length equal to or less than the length of said cap.

2. The cap of claim **1** wherein said passageway is an elongated tube.

3. The cap of claim **1** wherein said angle is between about 10 degrees to less than 90 degrees.

4. The cap of claim **1** wherein said top portion further includes a circumferential wall extending for a predetermined distance from said inside surface.

5. The cap of claim **1** wherein said passageway is sized to dispense viscous liquids.

6. The cap of claim **1** wherein said opening is concentric to said circumference of said inside surface.

7. The cap of claim **1** wherein said opening is eccentric to said circumference of said inside surface.

8. The cap of claim **1** further comprising a closing member for blocking said opening.

9. The cap of claim **8** wherein said closing member is hingedly attached to the circumference of said top portion.

10. The cap of claim **8** wherein said closing member is slidably connected to said top portion.

11. A viscous-liquid dispensing cap comprising a top portion having an elongated conduit therethrough wherein said elongated conduit has an inlet and an outlet, said inlet and said outlet being horizontally and vertically offset from each other, said inlet being at least ten millimeters from a perpendicular axis located at a point on the circumference of said top portion wherein said point on said circumference is closer to said outlet than said inlet, said elongated conduit being acutely angled to an inside surface of said top portion and having a length equal to or less than said cap.

12. The dispensing cap of claim **11** wherein an area of said top portion adjacent said outlet is thinner than the remainder of said top portion.

13. The dispensing cap of claim **11** further comprising a wall portion extending from the circumference of said top portion and extending from said inside surface.

14. The dispensing cap of claim **13** wherein said wall portion includes a retaining component for attaching said cap to a container.

15. The dispensing cap of claim **14** wherein said retaining component are threads.

* * * * *